



# *Presentation to the CEC on Solar Thermal Electricity Costs*



2003 Integrated Energy Policy Report



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February 25 and 26, 2003



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## *Duke Solar is World Leader in Providing Solar Solutions*

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- Duke Solar now independent from Duke Engineering and Services
- Duke Solar comprised of three business divisions
  - Power Generation
  - Buildings
  - Solar Water and Space Heating
- Recent 50 MW SEGS contract with SPPC/NPC (Nevada)
- Recent 1MW SEGS/ORC contracts with APS (Arizona)



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## *Inland Energy is Developer of Successful High Desert Power Plant*

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- Inland Energy initiated development of combined cycle project in 1992
- Constellation is builder/owner of 830 MW project with contract with DWR
- Scheduled to come on line in May, 2003 (ahead of schedule)

Inland and Duke Solar bring specific expertise  
that marry into solar combined cycle hybrid



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## *Solar Power Plant Levelized Costs in CEC Report “Out-of Date”*

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- Independent Report (Sargent and Lundy) prepared under auspices of USDOE show cost in 8 cents to 10 cents in 2007 time frame
- Also see “Pathway for Sustained Commercial Deployment of Solar Thermal Technologies”
  - [http://www.eere.energy.gov/csp/pdfs/kearney\\_roadmap.pdf](http://www.eere.energy.gov/csp/pdfs/kearney_roadmap.pdf)
- CEC Costs do not reflect savings of hybridized plant



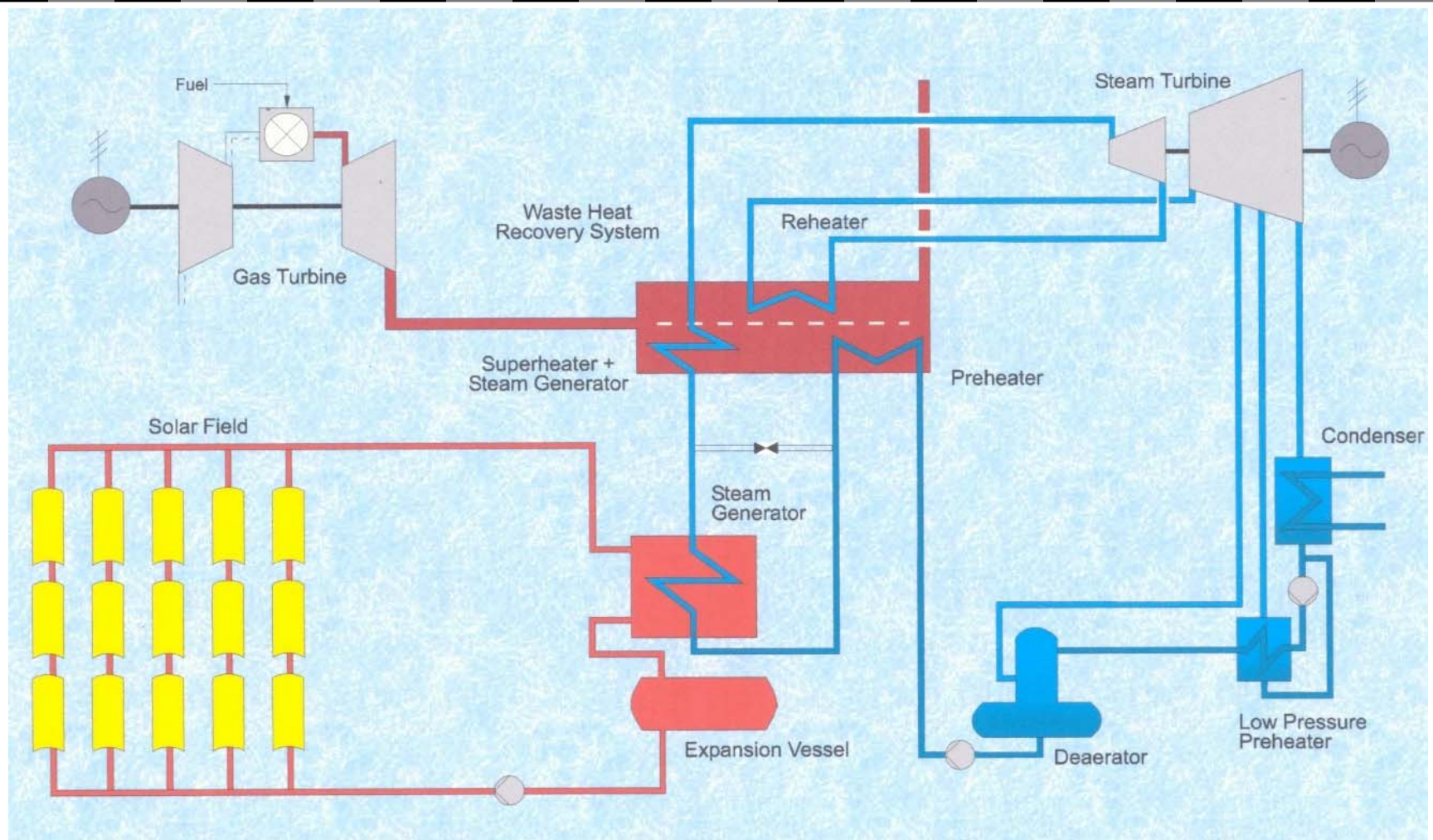
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## *Hybridized Solar with Combined Cycle Yields Best of Both Worlds*

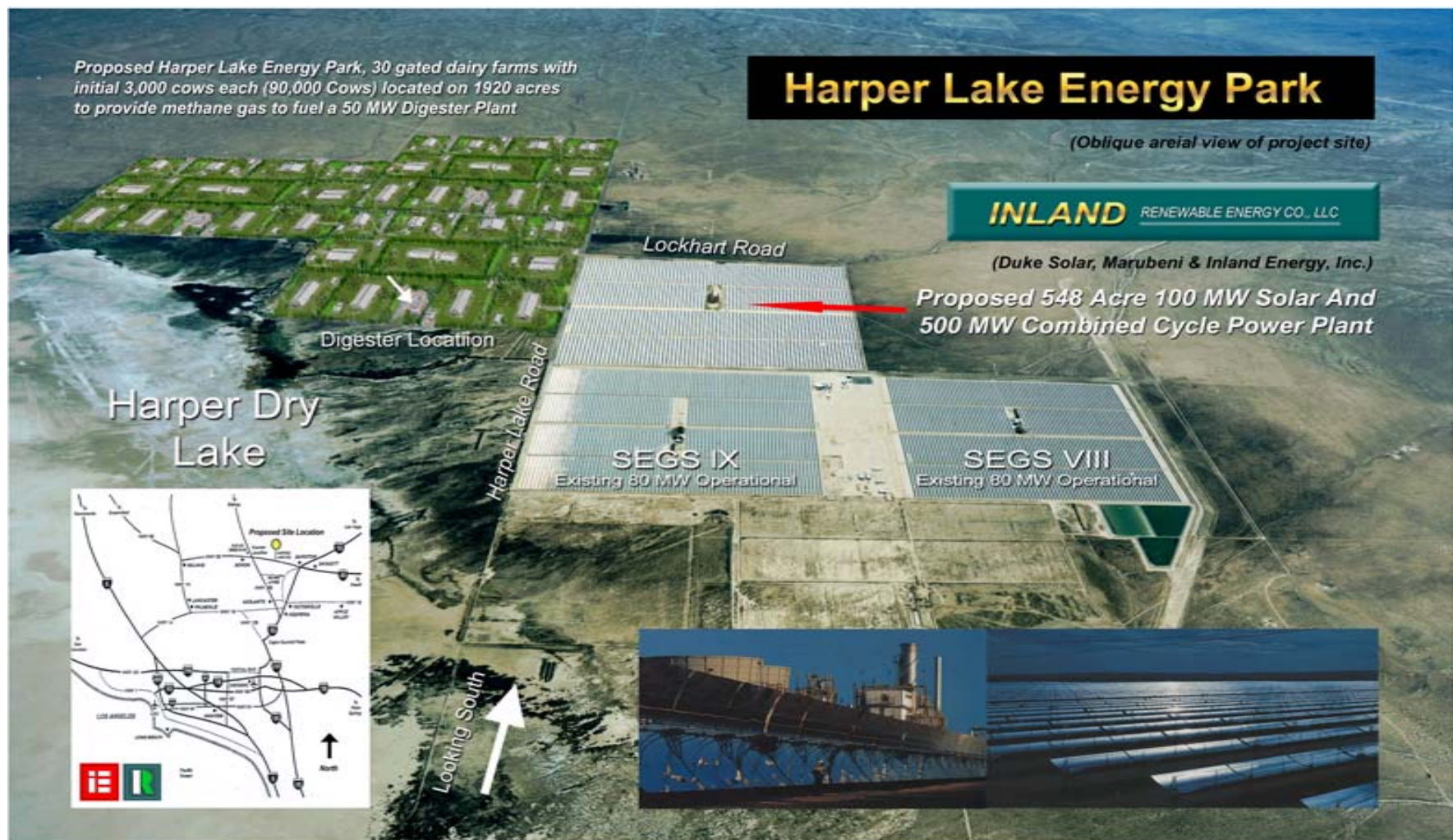
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- Load Following Combined Cycle Generation with solar component offers
  - On peak “green” generation with high reliability due to CC backup
  - Overall plant capable of 24x7 to provide maximum flexibility
  - Levelized solar power cost reduction due to
    - Higher solar conversion efficiencies
    - Economies of scale (e.g. incremental steam cycle pricing)
    - Commonality of infrastructure, staff and maintenance
- Overall lower emission from “solarized” CC plant

# *Integrated Solar Combined Cycle System*



# Harper Lake Energy Park Allows for Multiple Development of Green Technologies





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*Existing 830 MW CC Developed by  
Inland- Potential 2<sup>nd</sup> Unit w/Solar Assist*

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# *Southern California High Desert Premier Area for Solar Thermal*

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- High altitude to reduce haze and scatter
- Low cost land
- Infrastructure
  - Gas
  - Water
  - Transmission (may need upgrading)
- High insolation
- Minimal cloudy days
- Existing sites to “piggyback” permitting



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# *Solar Thermal Power Plants Provides Cost Competitive Energy*

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- Standalone solar provides competitive green energy costs; specific pricing dependent on siting, financing and size
- Hybridized solar plants with Combined Cycle offers flexibility to allow “Least Cost” and “Best Fit” use of the technology
  - Provides lower than standalone pricing with high reliability at coincident peak power needs
- Other hybridization possible with biogas and geothermal to produce pure green power



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## *Conclusion and Recommendation*

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- Solar energy costs in draft CEC report need to be revised to reflect up-to-date and state-of-the-art solar design and costs
- Hybridized solar with Combined Cycle needs to be included in CEC report as this will most likely be the configuration offered that produces least cost with least risk and highest reliability for the solar
- Other hybridization concepts. e.g. geothermal and biomass also offers cost competitive energy configurations